

# Tropos 1410 Wireless Mesh Router & Wireless Bridge for field area networks



Tropos 1410 wireless mesh routers and bridges are used to build field area networks for automation applications. They enable cost-effective and highly secure IP communications for utility, mining, oil and gas, and industrial applications that monitor and control field automation endpoints such as intelligent electrical devices, industrial process controllers and SCADA devices. Integrated firewalls and VPNs plus DNP3 over serial and Ethernet support provide enterprise-class security and future-proof operation to legacy automation devices installed in the field.

## Economical Solution for Field Area Networks

Utility, mining, oil and gas as well as other industries are increasingly using wireless communications networks to monitor and control thousands of automation devices in the field. These field area networks support a diverse set of applications including automated metering infrastructure and distribution automation for utilities; telemetry and mining management systems for mining; wellhead monitoring and logging for oil and gas; traffic signal management and video monitoring for transportation; process control for refining and chemicals; and SCADA for a variety of vertical markets. In the past, utilities and other industrial companies have often used proprietary low-speed wireless communications systems with little security to implement their field area networks.

The Tropos 1410 provides an economical vehicle for utilities and other industrial companies to securely implement field automation communication. It delivers the most advanced set of standards-based security features available for field area networks including a built-in firewall and a built-in IPsec VPN in every unit. Each Tropos 1410 implements a multi-layer, multi-application security model that provides defense-in-depth and enables traffic from different applications and user groups to be segregated on separate virtual local area networks (VLANs). Each VLAN has its own address space, quality of service policies and security policies including the ability to create one or more IPsec VPNs per VLAN. The

Tropos 1410 employs RADIUS, 802.1x, and 802.11i authentication, AES encryption and HTTPS-based remote access to secure field area networks from unauthorized devices, users and snooping. In addition, the product family's operating software complies with NIST FIPS 140-2 Level 2 for U.S. government cyber security and NERC CIP 002-009 for utility critical infrastructure protection.

## FEATURES AND BENEFITS

- ❖ 802.11b/g/n wireless mesh routers and bridges
- ❖ IPsec VPN and firewall in every device
- ❖ Ethernet or serial device connectivity
- ❖ DNP3, Modbus, SEL Mirrored Bits and IEC 61850 support
- ❖ Stand-alone and embedded versions
- ❖ Tropos Control network management

## Fully Flexible Product Options

Tropos offers two variants in the product line, the Tropos 1410 and the board-level Tropos 1410-B. The Tropos 1410 is packaged in a ruggedized, weatherized enclosure suitable for use in extreme outdoor environments. The Tropos 1410-B is a module suitable for integration into Smart Grid devices, process controllers and SCADA devices. Both products can be configured via software load to be either a bridge that connects to any standard 802.11b/g/n wireless network, including Tropos mesh networks, or a fully functional Tropos mesh router. When the Tropos 1410-B with mesh routing functionality is embedded in an automation endpoint, the endpoint helps to form the wireless mesh network infrastructure.

- ❖ **Wireless connectivity:** When configured as a wireless bridge, the Tropos 1410 and Tropos 1410-B can connect to any standard 802.11b/g/n network including a Tropos mesh network. When configured as a wireless mesh router, the Tropos 1410 and Tropos 1410-B can form a Tropos mesh network, fully integrate with other Tropos mesh router products in a mesh network and offer connectivity to any standard 802.11b/g/n client.
- ❖ **Wired connectivity:** The Tropos 1410's and Tropos 1410-B's wired connection supports 10/100BASE-T Ethernet, RS-232 serial or RS-485 serial.

- ❖ Automation protocol support: The Tropos 1410's and Tropos 1410-B's wired interface supports utility and industrial control protocols, including DNP3, Modbus, SEL Mirrored Bits and IEC 61850, to facilitate integration of legacy Smart Grid and process control devices.
- ❖ Secure end-to-end communications: The Tropos 1410's and Tropos 1410-B's supports multiple IPSec VPN tunnels with AES encryption for secure data communications from the wired ports where automation endpoints connect to the utility operations centers. When the Tropos 1410-B is embedded into an automation endpoint, the protection extends into the endpoint itself.

## Tropos Control Network Management

The Tropos 1410 can be centrally managed by Tropos' industry leading wireless network management, monitoring and control application, Tropos Control. Tropos Control allows the network administrator to monitor network performance in real-time and to perform complex tasks such as network configuration and over-the-air software upgrades.

### Wireless

- IEEE 802.11b/g/n radio
  - Frequency band: 2.4-2.483 GHz
  - Modulation: 802.11g/n - OFDM (64-QAM, 16-QAM, QPSK, BPSK); 802.11b - DSSS (DBPSK, DQPSK, CCK)
  - TX Power: FCC/IC 12-27 dBm set in 1 dB units
  - 6.0 dBi omnidirectional antennas
  - Media Access Protocol: CSMA/CA with ACK
  - RX Sensitivity:
    - 97 dBm @ 1 Mbps
    - 96 dBm @ 6 Mbps
  - Multi-antenna system: 2-Tx x 2-Rx
  - Support for 802.11n MIMO

### Networking

- Full 802.11b/n
- IEEE 802.3u autosenesing 10/100BASE-T Ethernet port
- IPv4; IPv6-ready
- BGP
- 802.1q VLAN support (ESSID and IP based tagging)
- Support for static and dynamic addressing for wireless and wired clients
- Onboard DHCP Server and Relay
- Session-persistent mobility across subnets
- Network Address Translation (NAT)
- IP multicast forwarding, IGMP V1, V2, V3; IGMP Proxy
- Automatic rate, power and channel control

### Quality of Service

- 802.11e WMM
- 802.1p/q with 4 queues per VLAN and ESSID
- 802.1p and DSCP
- VoIP and VoWiFi support
- Rate limiting (airtime and throughput based)

### Management

- RADIUS accounting
- Local and remote management tools via HTTPS
- Router access control
- Identity-based authentication (4 levels)
- Configuration save and restore
- Over the air software updates with rollback
- SNMP traps
- Wireless, network and client monitoring and statistics

### Security

- IPsec VPNs with tunnels to wired client interfaces using AES
- Authentication: WPA, WPA2, 802.11i, RADIUS, 802.1x (includes EAP-TLS, EAP-TTLS, EAP-SIM, PEAP)
- Encryption: open, WEP, TKIP, AES-CCM
- AES encryption of mesh and control traffic
- FIPS 140-2 Level 2 compliant
- NERC CIP 002-0009 compliant
- Multiple BSSIDs & ESSIDs (ESSID suppression)
- HTTPS-based remote access
- Integrated firewall
  - Packet filtering based on TCP port, protocol, SA, DA
  - Peer-to-peer blocking
  - Client access control lists
  - VPN filtering
  - Router access control
  - Denial of service attack detection
- Evil twin detection and reporting

### Environmental Specifications

- Operating temperature range: -40°C to 75°C
- Storage temperature range: -40°C to 85°C
- Weather rating: UL 579/IEC 60529 IP67
- Wind survivability: >165 mph
- Wind loading (165 mph): <300 Newtons
- ASTM B117 salt fog rust resistance compliant
- Shock & vibration: ETSI 300-19-2-4 spec T41.E class 4M3
- Transportation: ISTA 2A

### Wired Interfaces

- Serial: RS-232 or RS-485, DNP3 support
- Ethernet: 10/100BASE-T, DNP/IP support

### Power

- Unregulated input: 10-28 VDC (Tropos 1410)
- Regulated input 5VDC  $\pm$  0.5% ripple < 25 mV transient response < 50 mV (Tropos 1410-B)
- Power consumption: 3 W typical
- Power-on and network status lamp: green/red

### Physical

- Tropos 1410
  - Dimensions: 15.16" high x 6.97" wide x 2.01 deep
  - Weight: 4.0 lbs
- Tropos 1410-B
  - Dimensions: 6.15" long x 3.25" wide x 1.25" high
  - Weight: 8.0 oz.

### Wireless Approvals

- FCC CFR 47 Part 15
- Industry Canada RSS 210

### Safety Approvals

- UL 60950-1
- CSA 22.2 No. 60950-1
- UL 1449/IEC 60664-1

### Protection

- Antenna Protection:  $\leq$  0.5 $\mu$ J for 6kV/3kA @ 8/20 $\mu$ S Waveform
- Electrical Protection:
  - EN61000-4-4 Level 2 Electrical Fast Transient Burst Immunity
  - EN61000-4-3 Level 2 EMC Field Immunity
  - EN61000-4-2 Level 2 (contact), Level 3 (air) ESD immunity

### Warranty

- One (1) year on parts and labor; return to point of purchase
- Optional standard and premium support packages available

### Ordering Information

- Part Number: 14101000 for FCC and Canada Tropos 1410 wireless bridge, FCC TX, DC, 2.4 GHz, two integrated 6 dBi omni antennas, bracketry, weatherproof enclosure
- Part Number: 14102000 for FCC and Canada Tropos 1410 wireless bridge, FCC TX, DC, 2.4 GHz, two N connectors, bracketry, weatherproof enclosure
- Part Number: 1410B for FCC and Canada Tropos 1410 wireless bridge, FCC TX, DC, 2.4 GHz, board only



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